



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services

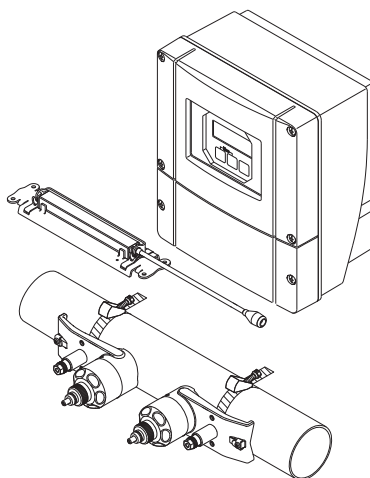


Solutions

Brief Operating Instructions

Proline Prosonic Flow 93

Ultrasonic flow measuring system



These Brief Operating Instructions are **not** intended to replace the Operating Instructions provided in the scope of supply. Detailed information is provided in the Operating Instructions and the additional documentation on the CD-ROM supplied.

The complete device documentation consists of:

- These Brief Operating Instructions
- Depending on the device version:
 - Operating Instructions and the Description of Device Functions
 - Approvals and safety certificates
 - Special safety instructions in accordance with the approvals for the device (e.g. explosion protection, pressure equipment directive, etc.)
 - Additional device-specific information

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1 Scope of the Brief Operating Instructions

Many versions of the Prosonic Flow 93 measuring system are available to suit different applications. These Brief Operating Instructions describe how to use the Prosonic Flow P and W versions (Clamp-on with strapping bands) and determine the installation distances via the transmitter.

The procedure to be followed for all other versions is described in the Operating Instructions on the CD-ROM.

1.1 Overview of information sources

Transmitter	Sensor	Type of mounting	Traverses	Description
Prosonic Flow 93	P (DN 15 to 65 / ½ to 2½")	Clamp-on	2	In these Brief Operating Instructions and in the Operating Instructions on the CD
Prosonic Flow 93	P (DN 50 to 4000 / 2 to 160")	Clamp-on (Strapping band)	1	In these Brief Operating Instructions and in the Operating Instructions on the CD
			2	
		Clamp-on (welded bolts)	1	In the Operating Instructions on the CD
			2	
Prosonic Flow 93	W (DN 15 to 65 / ½ to 2½")	Clamp-on	2	In these Brief Operating Instructions and in the Operating Instructions on the CD
Prosonic Flow 93	W	Clamp-on	1	In these Brief Operating Instructions and in the Operating Instructions on the CD
			2	
		Clamp-on (welded bolts)	1	In the Operating Instructions on the CD
			2	
		Insertion version	1	
			2	
Accessories for sound velocity measurement	DDU18	Clamp-on	1	In the Operating Instructions on the CD
Accessories for wall thickness measurement	DDU19	Clamp-on	–	in the Operating Instructions on the CD

Determining installation distances via:	Description
Transmitter (run a Quick Setup)	In these Brief Operating Instructions and in the Operating Instructions on the CD
FieldCare (operating software) in conjunction with the transmitter	In the Operating Instructions on the CD
Applicator (online via the Endress+Hauser Internet site)	In the Operating Instructions on the CD

2 Safety instructions

2.1 Designated use

- The measuring device described in these Operating Instructions is to be used only for measuring the flow rate of liquids in closed pipes, e.g.:
 - Acids, alkalis, paints, oils
 - Liquid gas
 - Ultrapure water with low conductivity, water, wastewater
- As well as measuring the volume flow, the sound velocity of the fluid is also always measured. Different fluids can be distinguished or the fluid quality can be monitored.
- Any use other than that described here compromises the safety of persons and the entire measuring system and is, therefore, not permitted.
- The manufacturer is not liable for damage caused by improper or non-designated use.

2.2 Installation, commissioning and operation

- The measuring device must only be installed, connected, commissioned and maintained by qualified and authorized specialists (e.g. electrical technicians, qualified welders - depending on the task) in full compliance with the instructions in these Brief Operating Instructions, the applicable norms, legal regulations and certificates (depending on the application).
- The specialists must have read and understood these Brief Operating Instructions and must follow the instructions they contain. If you are unclear on anything in these Brief Operating Instructions, you must read the Operating Instructions (on the CD-ROM). The Operating Instructions provide detailed information on the measuring device.
- The measuring device may only be modified if such work is expressly permitted in the Operating Instructions (on the CD-ROM).
- Repairs may only be performed if a genuine spare parts kit is available and this repair work is expressly permitted.
- If performing welding work on the piping, the welding unit may not be grounded by means of the measuring device.

2.3 Operational safety

- The measuring device is designed to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate. Relevant regulations and standards have been observed.
- The manufacturer reserves the right to modify technical data without prior notice. Your Endress+Hauser distributor will supply you with current information and updates to these Operating Instructions.
- The information on the warning notices, nameplates and connection diagrams affixed to the device must be observed. These contain important data on the permitted operating conditions, the range of application of the device and information on the materials used.

- If the device is not used at atmospheric temperatures, compliance with the relevant marginal conditions as specified in the device documentation supplied (on CD-ROM) is mandatory.
- Observe the technical data on the nameplate.
- The device must be wired as specified in the wiring and connection diagrams. Interconnections must be permitted.
- All parts of the device must be included in the potential equalization of the system.
- Cables, certified cable glands and certified dummy plugs must be suitable to withstand the prevailing operating conditions, (ambient temperature range, process conditions). Housing apertures that are not used must be sealed with certified dummy plugs.
- When hot fluids pass through the measuring tube, the surface temperature of the housing increases. In the case of the sensor, in particular, users should expect temperatures that can be close to the fluid temperature. If the temperature of the fluid is high, implement sufficient measures to prevent burning or scalding.
- Hazardous areas
Measuring devices for use in hazardous areas are labeled accordingly on the nameplate. Relevant national regulations must be observed when operating the device in hazardous areas. The Ex documentation on the CD-ROM is an integral part of the entire device documentation. The installation regulations, connection data and safety instructions provided in the Ex documentation must be observed. The symbol on the front page provides information on the approval and certification body (Ⓔ Europe, Ⓕ USA, Ⓒ Canada). The nameplate also bears the documentation number of this Ex documentation (XA***D/.../..).
- Endress+Hauser will be happy to assist in clarifying any questions on approvals, their application and implementation.

2.4 Safety conventions



Warning!

"Warning" indicates an action or procedure which, if not performed correctly, can result in injury or a safety hazard. Comply strictly with the instructions and proceed with care.



Caution!

"Caution" indicates an action or procedure which, if not performed correctly, can result in incorrect operation or destruction of the device. Comply strictly with the instructions.



Note!

"Note" indicates an action or procedure which, if not performed correctly, can have an indirect effect on operation or trigger an unexpected response on the part of the device.

3 Installation

3.1 Installation conditions

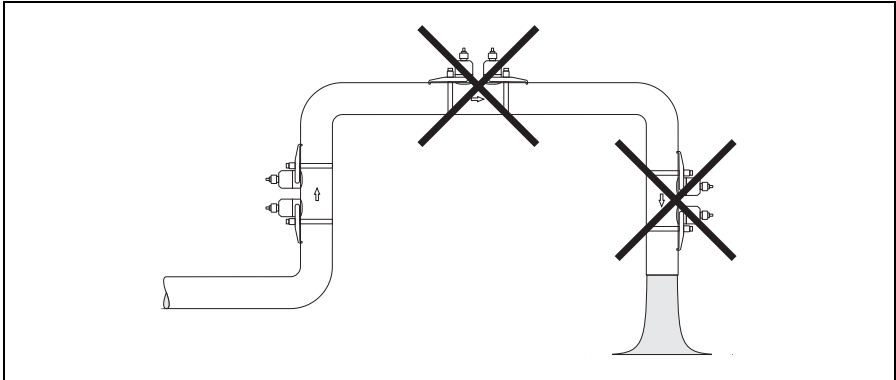
3.1.1 Dimensions

For the dimensions of the measuring device, see the associated Technical Information on the CD-ROM.

Mounting location

Correct flow measurement is possible only if the pipe is full. Entrained air or gas forming in the pipe can result in an increase in measuring errors. For this reason avoid the following mounting locations in the pipe:

- Highest point of a pipeline. Risk of air accumulating.
- Directly upstream of a free pipe outlet in a vertical pipeline.



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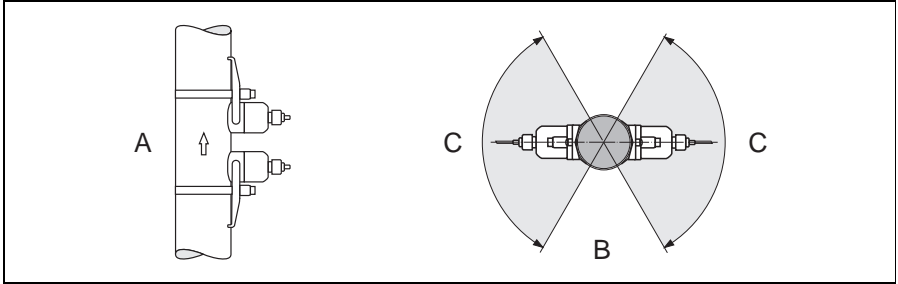
Orientation

Vertical

Recommended orientation with upward direction of flow (View A). With this orientation, entrained solids will sink and gases will rise away from the sensor when the fluid is stagnant. The piping can be completely drained and protected against solids buildup.

Horizontal

In the recommended installation range in a horizontal installation position (View B), gas and air collections at the pipe cover and problematic deposits at the bottom of the pipe have a smaller influence on measurement.



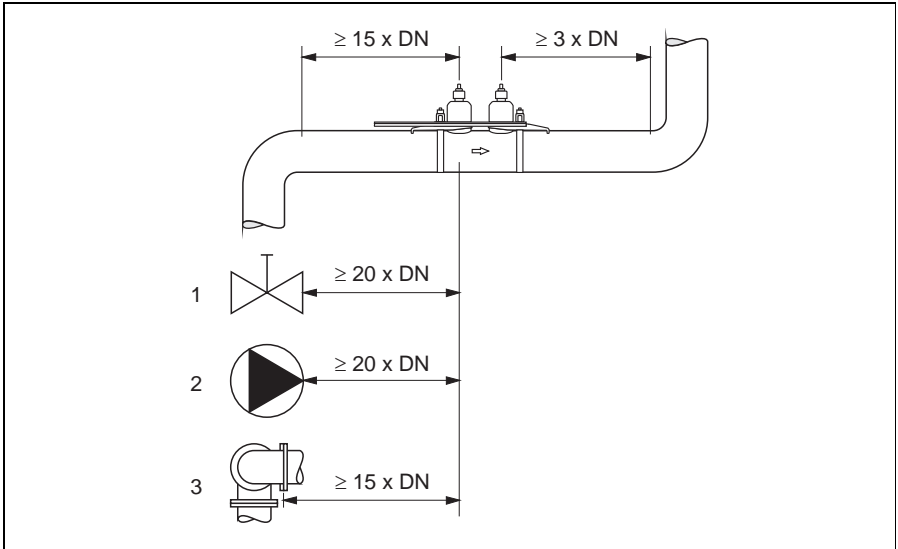
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Fig. 1: Horizontal orientation

- A Recommended orientation with upward direction of flow
- B Recommended installation range with horizontal orientation
- C Recommended installation range max. 120°

Inlet and outlet run

If possible, install the sensor well clear of fittings such as valves, T-pieces, elbows, etc. Compliance with the following inlet and outlet runs is recommended in order to ensure measuring accuracy.



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Fig. 2: Inlet and outlet run (top view)

- 1 Valve (2/3 open)
- 2 Pump
- 3 Two pipe bends in different directions

3.2 Preparatory steps prior to installation

Depending on the conditions specific to the measuring point (e.g. Clamp-on, number of traverses, fluid, etc.), a number of preparatory steps have to be taken before actually installing the sensors:

1. Using the conditions specific to the measuring point, determine which installation distances are necessary for installation.
2. Determine the values for the requisite installation distances.
A number of methods are available for determining the values:
 - Local operation of the device
 - FieldCare (operating program) → procedure explained in the Operating Instructions on the CD-ROM
 - Applicator (software) → procedure explained in the Operating Instructions on the CD-ROM
3. Mechanical preparation of the Clamp-on holders for the sensors:
 - Premount the strapping bands: DN 50 to 200 (2 to 8") or DN 250 to 4000 (10 to 160")
 - Fix the welded bolts → procedure explained in the Operating Instructions on the CD-ROM

3.3 Determining the necessary installation distances

The installation distances that are necessary for installation depend on:

- The type of sensor: Prosonic Flow P (DN 50 to 4000 / 2 to 160"), Prosonic Flow P (DN 15 to 65 / ½ to 2½") or Prosonic Flow W
- Insertion version: Clamp-on with strapping band or welded bolt, installation in pipe
- Number of traverses or single-path/dual-path version

3.3.1 Installation distances for Prosonic Flow P and Prosonic Flow W (DN 15 to 65 / ½ to 2½")

DN 15 to 65 (½ to 2½") Clamp-on (Strapping band) 2 traverses
SENSOR DISTANCE
–

3.3.2 Installation distances for Prosonic Flow P and Prosonic Flow W (DN 50 to 4000 / 2 to 160")

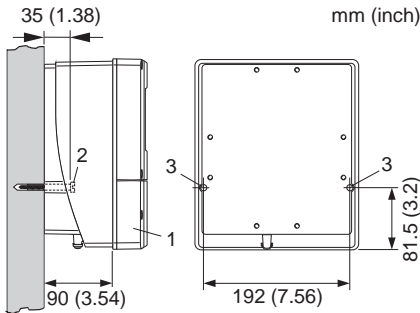
DN 50 to 4000 (2 to 160")			
Clamp-on (Strapping band)		Clamp-on (welded bolt)	
1 traverse	2 traverses	1 traverse	2 traverses
SENSOR DISTANCE	SENSOR DISTANCE	SENSOR DISTANCE	SENSOR DISTANCE
WIRE LENGTH	POSITION SENSOR	WIRE LENGTH	POSITION SENSOR

3.4 Installing the transmitter

 Caution!

- The ambient temperature range -20 to $+60$ °C (-4 to $+140$ °F) may not be exceeded at the mounting location. Avoid direct sunlight.
- Always install the wall-mount housing in such a way that the cable entries point downwards.

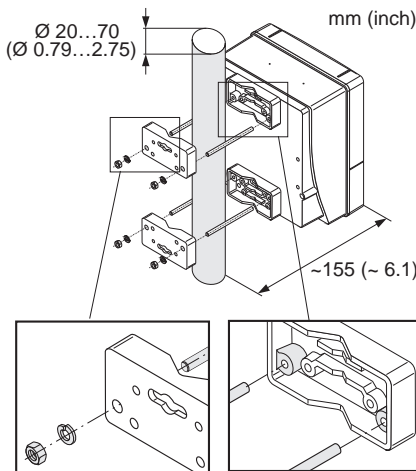
3.4.1 Direct wall mounting




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1. Connection compartment
2. Securing screws M6 (max. \varnothing 6.5 mm (0.25")); screw head max. \varnothing 10.5 mm (0.4")
3. Housing bores for securing screws

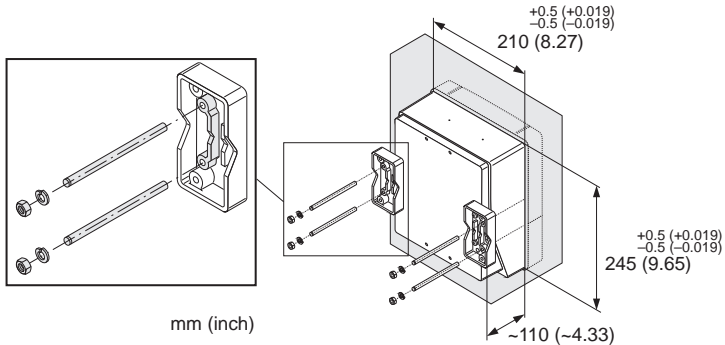
3.4.2 Pipe mounting



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 Caution!
 Danger of overheating!
 If the device is mounted on a warm pipe, make sure that the housing temperature does not exceed $+60$ °C ($+140$ °F) which is the maximum temperature permitted.

3.4.3 Panel mounting



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3.5 Connecting the power supply



Warning!

Risk of electric shock. Components carry dangerous voltages.

- Never mount or wire the measuring device while it is connected to the power supply.
- Before connecting the power supply, check the safety equipment.
- Route the power supply cable so that it is seated securely.
- Seal the cable entries and covers tight.
- When wiring Ex-certified measuring devices, all the safety instructions, wiring diagrams, technical information, etc. of the related Ex documentation must be observed
→ Ex documentation on the CD-ROM.



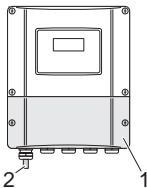
Caution!

Risk of damaging the electronic components!

Connect the power supply in accordance with the connection data on the nameplate.

3.5.1 Connecting the transmitter

Wire the unit using the terminal assignment diagram inside the cover.



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Transmitter connection:

- 1 Connection compartment cover
(connection diagram on the inside)
- 2 Power supply cable

3.5.2 Protective ground connection

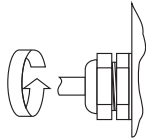
The sensor must be connected to the protective ground of the plant.
The plant grounding guidelines must be taken into account.

3.5.3 Degree of protection

The devices meet all the requirements for IP 67.

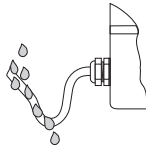
After mounting in the field or service work, the following points have to be observed to ensure that IP 67 protection is retained:

- Install the measuring device in such a way that the cable entries do not point upwards.
- Do not remove the seal from the cable entry.
- Remove all unused cable entries and plug them with suitable, certified drain plugs.
- When working at low temperatures (below -20 °C / -4 °F), in particular, ensure the suitability of the cables, cable entries and plugs is certified for these temperatures.



Tighten the cable entries correctly.

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The cables must loop down before they enter the cable entries ("water trap").

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3.5.4 Post-connection check

- Are cables or the device damaged (visual inspection)?
- Does the supply voltage match the information on the nameplate?
- Do the cables comply with the specifications?
- Do the mounted cables have adequate strain relief and are they routed securely?
- Are all screw terminals firmly tightened?
- Are all cable entries installed, firmly tightened and correctly sealed?
- Cable routed as a "water trap" in loops?
- Are all the housing covers installed and securely tightened?

3.6 Determining the installation distances

3.6.1 Running the "Sensor Installation" Quick Setup menu












Calling the Quick Setup

All the installation distances required for sensor mounting are determined with the Quick Setup.



Note!

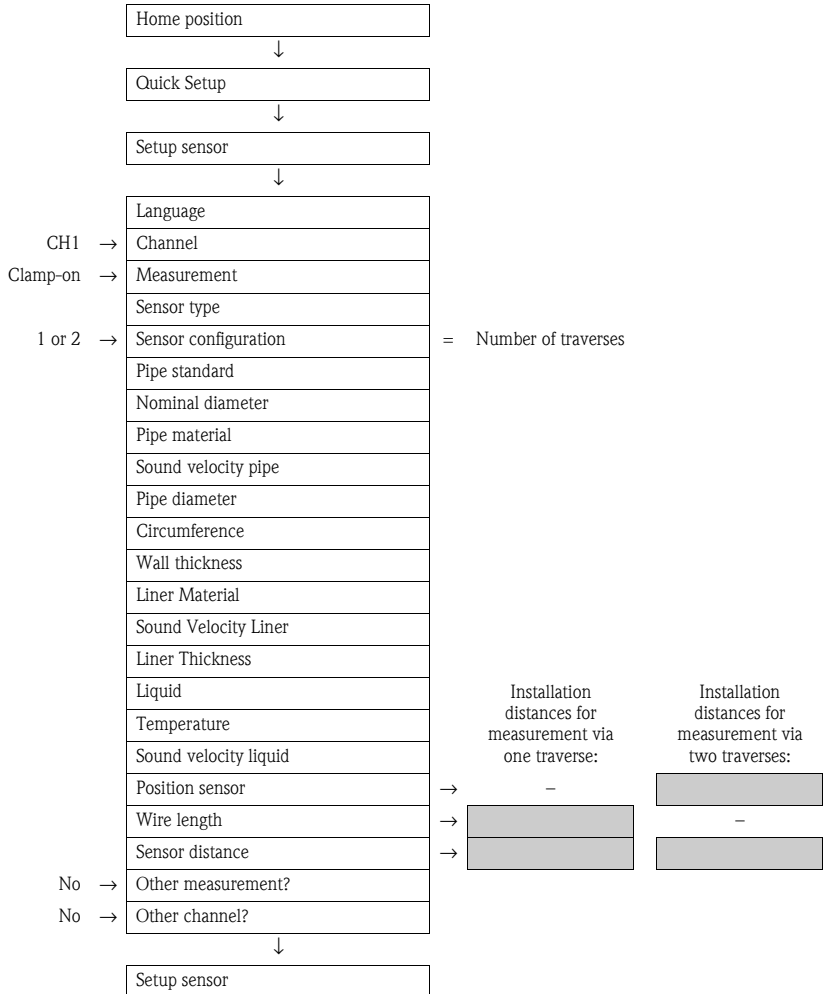
If you are not familiar with the operation of the device → [36](#).

1.  → Enter the function matrix (starting with measured value display)
2.  → Select the group QUICK SETUP
 → Confirm selection
3.  → Select the SENSOR INSTALLATION function
 → Confirm selection
4. Intermediate step if configuration is blocked:
 → Enter the code **93** (confirm with ) and thus enable configuration
5.  → Go to Sensor Installation Quick Setup
6.  → Select YES
 → Confirm selection
7.  → Start Sensor Installation Quick Setup

For subsequent steps, see the following section "Running the Quick Setup for Clamp-on type of mounting".

Running the Quick Setup for Clamp-on type of mounting

- Only the steps necessary for the type of mounting (Clamp-on) are described.
- Enter or select installation-specific values or the values specified here.
- Read off the installation distances necessary for mounting.



3.7 Mechanical preparation

The way in which the sensors are secured differs on account of the pipe nominal diameter and the sensor type. Depending on the type of sensor, users also have the option of securing the sensors with strapping bands or screws such that they can be later removed, or permanently fixing the sensors in place with welded bolts or welded holders.

Overview of possible ways to secure the various sensors:

Prosonic Flow		Pipe nominal diameter	Secured by
93P 93W	DN 15 to 65 (½ to 2½")	DN ≤ 32 (1¼")	Holder with U-shaped screws → 14
		DN > 32 (1¼")	Holder with strapping bands → 15
93P 93W	DN 50 to 4000 (2 to 160")	DN ≤ 200 (8")	Strapping bands (medium nominal diameters) → 16
			Welded bolts → 18
		DN > 200 (8")	Strapping bands (large nominal diameters) → 17
			Welded bolts → 18

3.7.1 Mounting the holder with U-shaped screws

Sensor: Prosonic Flow 93P and Prosonic Flow 93W (DN 15 to 65 / ½ to 2½")

For mounting on a pipe with a nominal diameter of DN ≤ 32 (1¼").

1. Disconnect the sensor from the holder.
2. Position the holder on the pipe.
3. Put the U-shaped screws through the holder and slightly lubricate the thread.
4. Screw nuts onto the U-shaped screws.
5. Set the holder to the exact position and tighten the nuts evenly.

Warning!

Risk of damaging plastic or glass pipes if the nuts of the U-shaped screws are tightened too much! The use of a metal half-shell is recommended (on the opposite side of the sensor) when working with plastic or glass pipes.

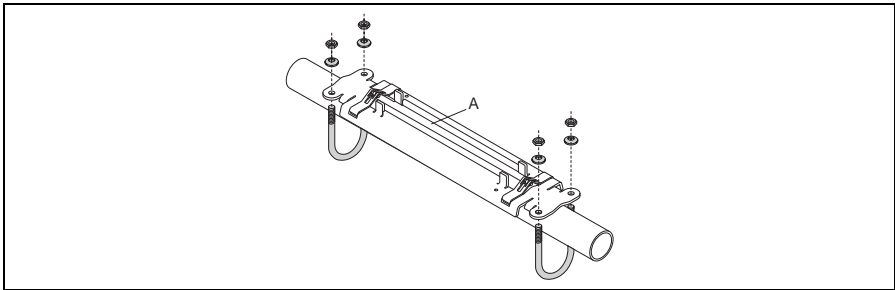


Fig. 3: Mounting the Prosonic Flow P holder (DN 15 to 65 / ½ to 2½") with U-shaped screws

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3.7.2 Mounting the holder with strapping bands

For sensor: Prosonic Flow 93P and Prosonic Flow 93W (DN 15 to 65 / ½ to 2½")
 For mounting on a pipe with a nominal diameter of DN > 32 (1¼").

1. Disconnect the sensor from the sensor holder.
2. Position the sensor holder on the pipe.
3. Wrap the strapping bands around the sensor holder and pipe without twisting them.
4. Guide the strapping bands through the strapping band locks (tensioning screw is pushed up).
5. Tighten the strapping bands as tight as possible by hand.
6. Set the sensor holder to the desired position.
7. Push down the tensioning screw and tighten the strapping bands so that they cannot slip.
8. Where necessary, shorten the strapping bands and trim the cut edges.



Warning!

Risk of injury. To avoid sharp edges, trim the cut edges after shortening the strapping bands.

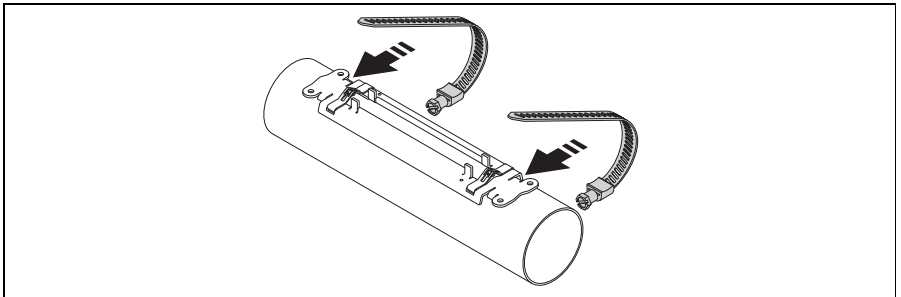


Fig. 4: Positioning the holder and mounting the strapping bands

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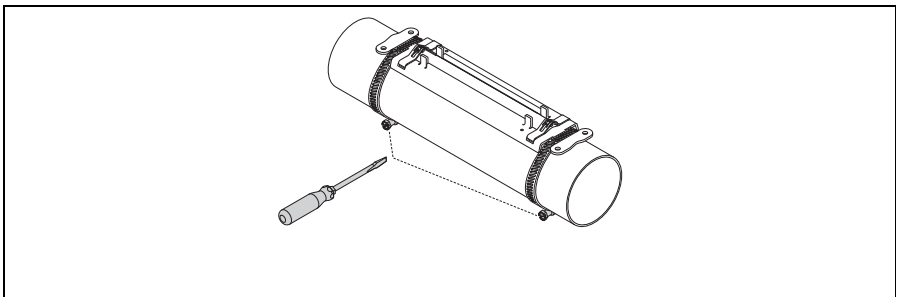


Fig. 5: Tightening the tensioning screws of the strapping bands

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3.7.3 Premounting the strapping bands (medium nominal diameters)

For sensors: Prosonic Flow 93P and Prosonic Flow 93W(DN 50 to 4000 / 2 to 160")

When mounting on a pipe with a nominal diameter of $DN \leq 200$ (8").

First strapping band

1. Fit the mounting bolt over the strapping band.
2. Wrap the strapping band around the pipe without twisting it.
3. Guide the end of the strapping band through the strapping band lock (tensioning screw is pushed up).
4. Tighten the strapping band as tight as possible by hand.
5. Set the strapping band to the desired position.
6. Push down the tensioning screw and tighten the strapping band so that it cannot slip.

Second strapping band

7. Proceed as for the first strapping band (steps 1 to 7). Only slightly tighten the second strapping band for final mounting. It must be possible to move the strapping band for final alignment.

Both strapping bands

8. Where necessary, shorten the strapping bands and trim the cut edges.

 **Warning!**

Risk of injury. To avoid sharp edges, trim the cut edges after shortening the strapping bands.

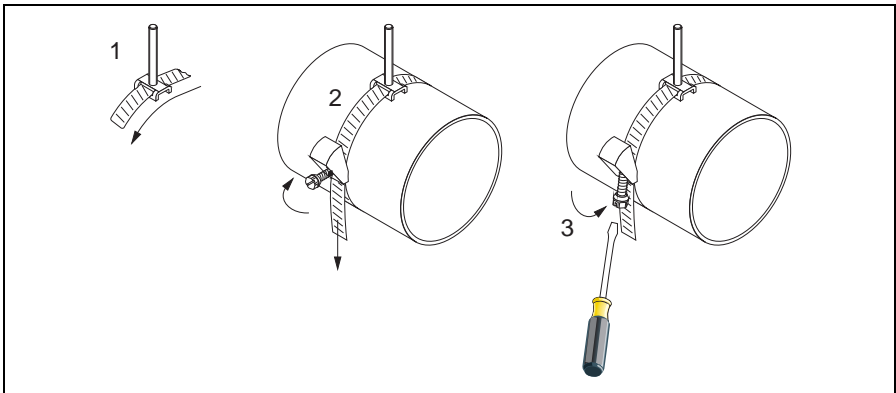


Fig. 6: Premounting strapping bands for pipe diameters $DN \leq 200$ (8")

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- 1 Mounting bolt
- 2 Strapping band
- 3 Tensioning screw

3.7.4 Premounting the strapping bands (large nominal diameters)

For sensors: Prosonic Flow 93P (DN 50 to 4000 / 2 to 160"), Prosonic Flow 93W
When mounting on a pipe with a nominal diameter of DN > 200 (8").

1. Measure the pipe circumference.
2. Shorten the strapping bands to one length (pipe circumference + 10 cm (3.94")) and trim the cut edges.

 **Warning!**

Risk of injury. To avoid sharp edges, trim the cut edges after shortening the strapping bands.

First strapping band

3. Fit the centering plate along with the mounting bolt over the strapping band.
4. Wrap the strapping band around the pipe without twisting it.
5. Guide the end of the strapping band through the strapping band lock (tensioning screw is pushed up).
6. Tighten the strapping band as tight as possible by hand.
7. Set the strapping band to the desired position.
8. Push down the tensioning screw and tighten the strapping band so that it cannot slip.

Second strapping band

9. Proceed as for the first strapping band (steps 3 to 8). Only slightly tighten the second strapping band for final mounting. It must be possible to move the strapping band for final alignment.

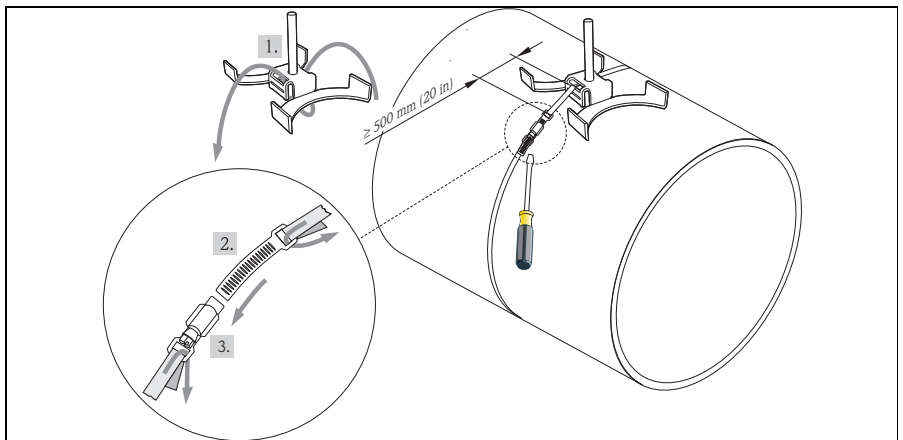


Fig. 7: Premounting strapping bands for pipe diameters DN > 200 (8")

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- 1 Centering plate with mounting bolt
- 2 Strapping band
- 3 Tensioning screw

3.7.5 Mounting the welded bolts

For sensors: Prosonic Flow 93P (DN 50 to 4000 / 2 to 160"), Prosonic Flow 93W
When mounting on a pipe with a nominal diameter of DN 50 to 4000 (2 to 160").

Procedure

The welded bolts must be fixed at the same installation distances as the mounting bolts with strapping bands. The following sections explain how to align the mounting bolts depending on the type of mounting and the measurement method:

- Prosonic Flow P (DN 50 to 4000 / 2 to 160")
 - Installation for measurement via one traverse → 21
 - Installation for measurement via two traverses → 24.
- Prosonic Flow W
 - Installation for measurement via one traverse → 26
 - Installation for measurement via two traverses → 26.

The sensor holder is secured with a retaining nut with a metric ISO M6 thread as standard. If you want to use another thread to secure the holder, you must use a sensor holder with a removable retaining nut (order number: 93WAX - xBxxxxxxxxxx).

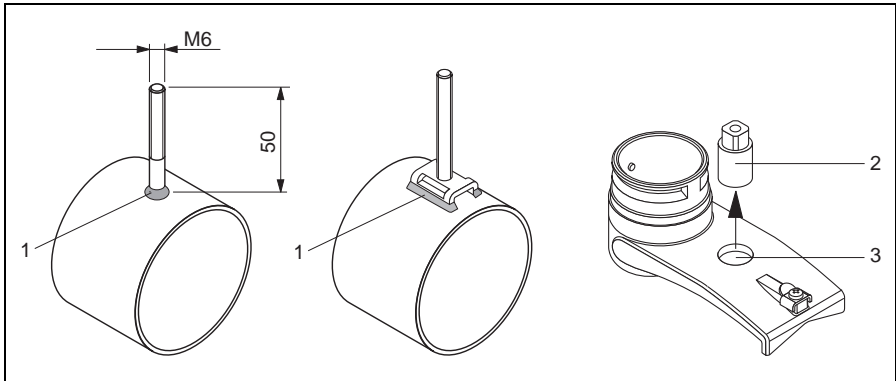


Fig. 8: Use of welded bolts

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- 1 Welding seam
- 2 Retaining nut
- 3 Hole diameter max. 8.7 mm (0.34")

3.8 Installing the sensor

3.9 Installing Prosonic Flow P and Prosonic Flow 93W (DN 15 to 65 / ½ to 2½")

3.9.1 Mounting the sensor

Prerequisites

- The installation distance (sensor distance) is known → 8.
- The sensor holder is already mounted → 14.

Material

The following material is needed for mounting:

- Sensor incl. adapter cable
- Connecting cable for connecting to the transmitter
- Coupling fluid for an acoustic connection between the sensor and pipe

Procedure

1. Set the distance between the sensors as per the value determined for the sensor distance. Press the sensor down slightly to move it.

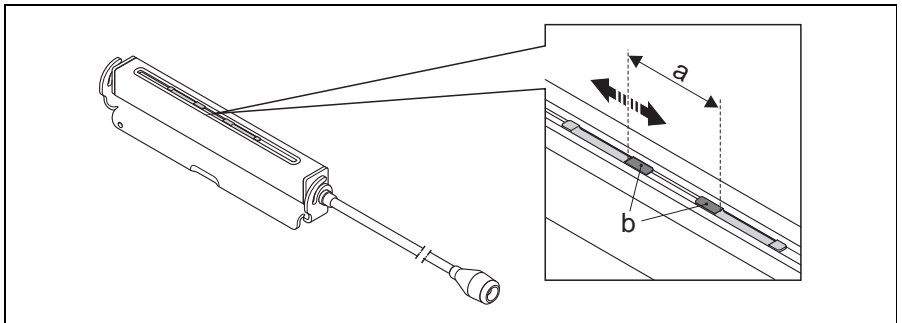


Fig. 9: Setting the distance between the sensors as per the value for the sensor distance

- a Sensor distance
b Contact surfaces of the sensor

2. Coat the contact surfaces of the sensors with an even layer of coupling fluid (approx. 0.5 to 1 mm / 0.02 to 0.04" thick).
3. Fit the sensor housing on the holder.

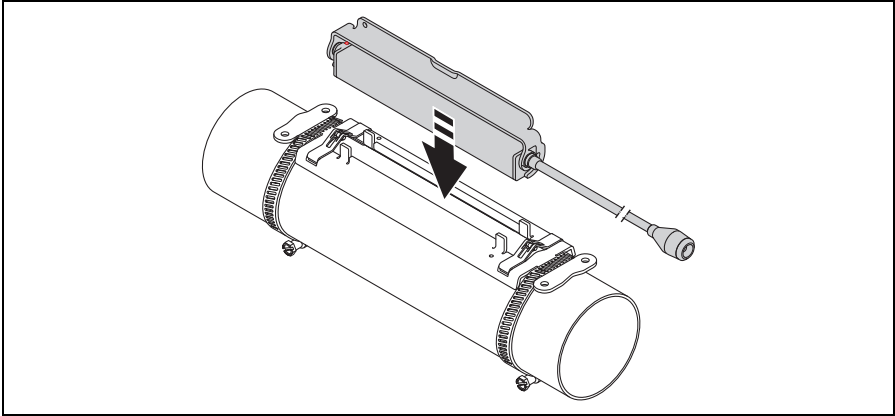


Fig. 10: Fitting the sensor housing

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4. Engage the bracket to fix the sensor housing in place on the holder.



Note!

- If necessary, the holder and sensor housing can be secured with a screw/nut or a lead-seal (not part of the scope of supply).
- The bracket can only be released using an auxiliary tool.

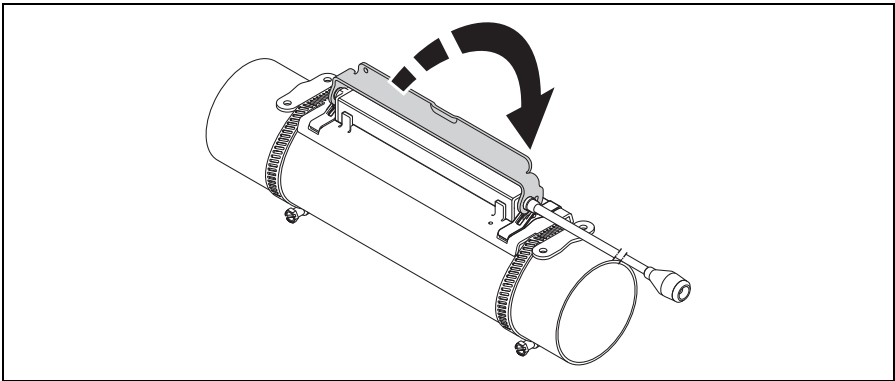


Fig. 11: Setting the distance between the sensors as per the value for the sensor distance

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5. Connect the connecting cable to the adapter cable.

This completes the mounting process. The sensors can now be connected to the transmitter via the connecting cables → [30](#).

3.10 Installing Prosonic Flow P (DN 50 to 4000 / 2 to 160")

3.10.1 Installation for measurement via one traverse



Note!

The procedure is identical for Prosonic Flow W.

Prerequisites

- The installation distances (sensor distance and wire length) are known → 8.
- The strapping bands are already mounted → 16/ → 17.

Material

The following material is needed for mounting:

- Two strapping bands incl. mounting bolts and centering plates where necessary (already mounted)
- Two measuring wires, each with a cable lug and a fixer to position the strapping bands
- Two sensor holders
- Coupling fluid for an acoustic connection between the sensor and pipe
- Two sensors incl. connecting cables.

Procedure

1. Prepare the two measuring wires:
 - Arrange the cable lugs and fixer such that the distance they are apart corresponds to the wire length (SL).
 - Screw the fixer onto the measuring wire.

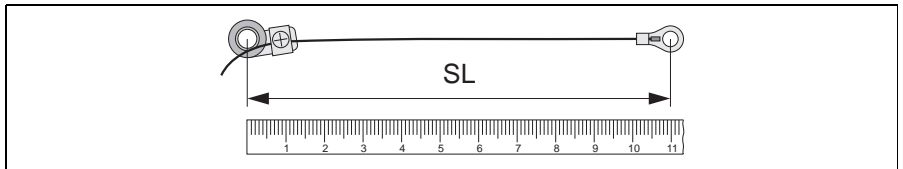


Fig. 12: Fixer (a) and cable lugs (b) at a distance that corresponds to the wire length (SL)

A0001112

2. With the first measuring wire:
 - Fit the fixer over the mounting bolt of the strapping band that is already securely mounted.
 - Run the measuring wire **clockwise** around the pipe.
 - Fit the cable lug over the mounting bolt of the strapping band that can still be moved.
3. With the second measuring wire:
 - Fit the cable lug over the mounting bolt of the strapping band that is already securely mounted.
 - Run the measuring wire **counterclockwise** around the pipe.
 - Fit the fixer over the mounting bolt of the strapping band that can still be moved.

4. Take the still movable strapping band, incl. the mounting bolt, and move it until both measuring wires are evenly tensioned and tighten the strapping band so that it cannot slip.

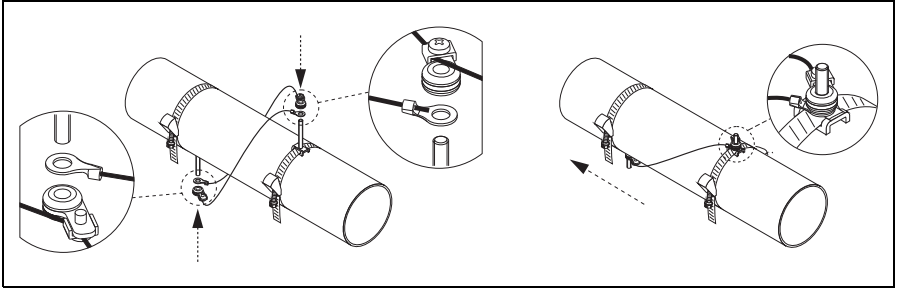


Fig. 13: Positioning the strapping bands (steps 2 to 4)

A0001113

5. Loosen the screws of the fixers on the measuring wires and remove the measuring wires from the mounting bolt.
6. Fit the sensor holders over the individual mounting bolts and tighten securely with the retaining nut.

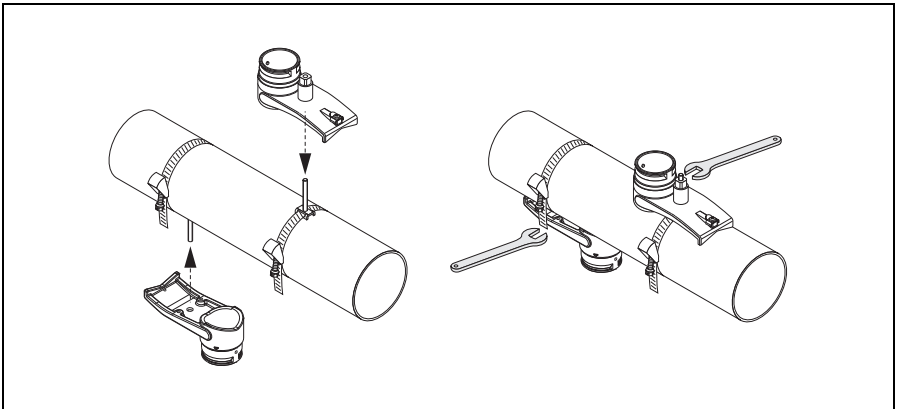


Fig. 14: Mounting the sensor holders

A0001114

7. Coat the contact surfaces of the sensors with an even layer of coupling fluid approx. 1 mm (0.04") thick, going from the groove through the center to the opposite edge.

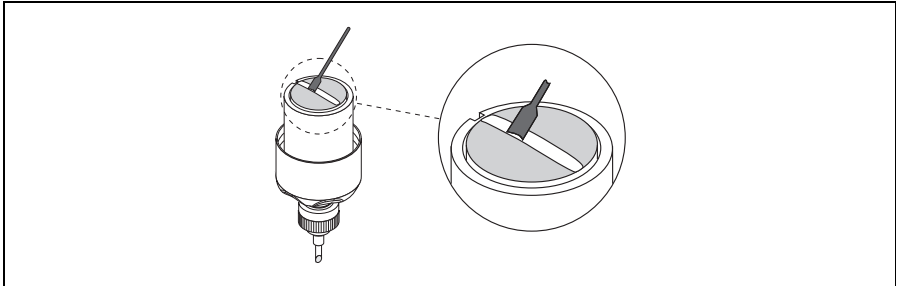


Fig. 15: Coating the contact surfaces of the sensor with coupling fluid

A0011373

8. Insert the sensor into the sensor holder.
9. Fit the sensor cover on the sensor holder and turn until:
 - The sensor cover engages with a click
 - The arrows (▲ / ▼ "close") are pointing towards one another.
10. Screw the connecting cable into the individual sensor.

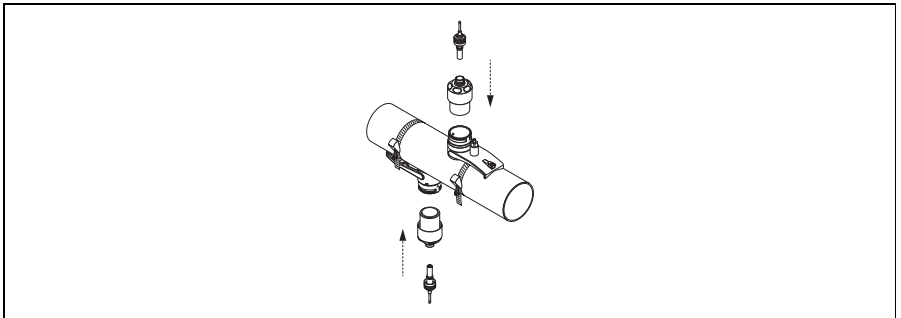


Fig. 16: Mounting the sensor and connecting the connecting cable

A0001115

This completes the mounting process. The sensors can now be connected to the transmitter via the connecting cables → [30](#).

3.10.2 Installation for measurement via two traverses

Prerequisites

- The installation distance (position sensor) is known → 8.
- The strapping bands are already mounted → 16/→ 17.

Material

The following material is needed for mounting:

- Two strapping bands incl. mounting bolts and centering plates where necessary (already mounted)
- A mounting rail to position the strapping bands
- Two mounting rail holders
- Two sensor holders
- Coupling fluid for an acoustic connection between the sensor and pipe
- Two sensors incl. connecting cables.

Mounting rail and POSITION SENSOR installation distance

The mounting rail has two rows with bores. The bores in one of the rows are indicated by letters and the bores in the other row are indicated by numerical values. The value determined for the POSITION SENSOR installation distance is made up of a letter and a numerical value.

The bores that are identified by the specific letter and numerical value are used to position the strapping bands.

Procedure

1. Position the strapping bands with the aid of the mounting rail.
 - Slide the mounting rail with the bore identified by the letter from POSITION SENSOR over the mounting bolt of the strapping band that is permanently fixed in place.
 - Position the movable strapping band and slide the mounting rail with the bore identified by the numerical value from POSITION SENSOR over the mounting bolt.

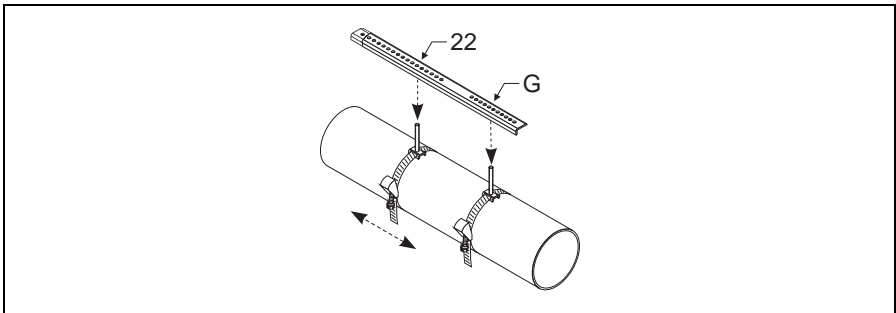


Fig. 17: Determining the distance in accordance with the mounting rail (e.g. POSITION SENSOR G22)

A0001110

2. Tighten the strapping band so that it cannot slip.
3. Remove the mounting rail from the mounting bolt.
4. Fit the sensor holders over the individual mounting bolts and tighten securely with the retaining nut.
5. Screw the holders of the mounting rail onto the sensor holder in question.
6. Screw the mounting rail onto the sensor holders.

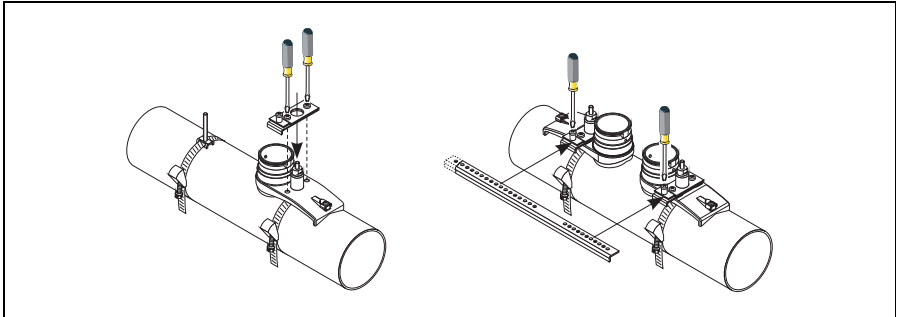


Fig. 18: Mounting the sensor holders and mounting rail

A0001156

7. Coat the contact surfaces of the sensors with an even layer of coupling fluid approx. 1 mm (0.04") thick, going from the groove through the center to the opposite edge.

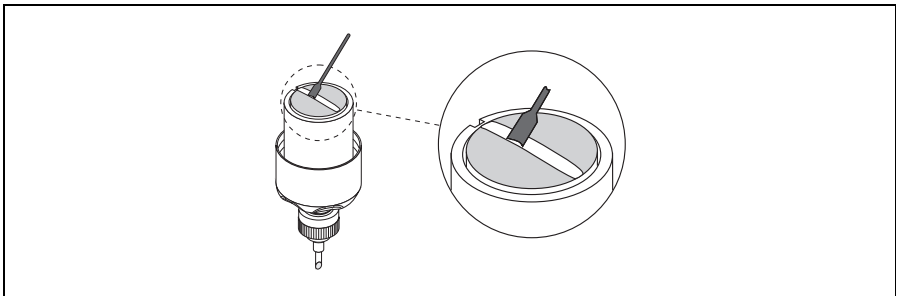


Fig. 19: Coating the contact surfaces of the sensor with coupling fluid

A0011373

8. Insert the sensor into the sensor holder.
9. Fit the sensor cover on the sensor holder and turn until:
 - The sensor cover engages with a click
 - The arrows (▲ / ▼ "close") are pointing towards one another.

10. Screw the connecting cable into the individual sensor.

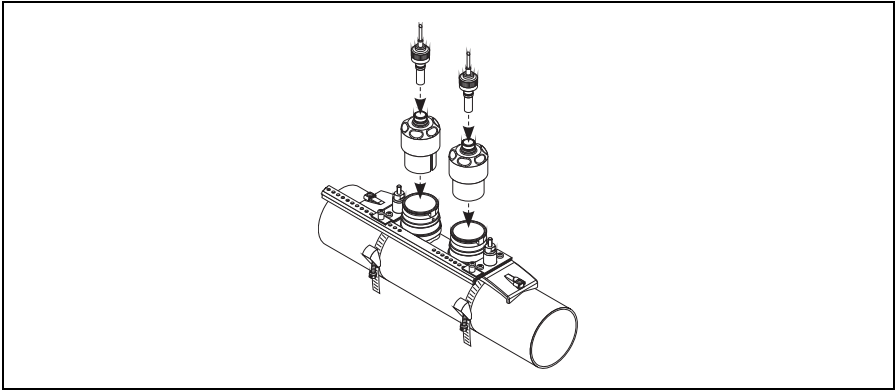


Fig. 20: Mounting the sensor and connecting the connecting cable

A0001112

This completes the mounting process. The sensors can now be connected to the transmitter via the connecting cables → [30](#).

3.11 Installing Prosonic Flow W (Clamp-on)

3.11.1 Installation for measurement via one traverse



Note!

The procedure is like that for Prosonic Flow P (DN 50 to 4000 / 2 to 160") → [21](#).

3.11.2 Installation for measurement via two traverses

Prerequisites

- The installation distance (position sensor) is known → [8](#).
- The strapping bands are already mounted → [16](#)/→ [17](#).

Material

The following material is needed for mounting:

- Two strapping bands incl. mounting bolts and centering plates where necessary (already mounted)
- A mounting rail to position the strapping bands
- Two mounting rail holders
- Two sensor holders
- Coupling fluid for an acoustic connection between the sensor and pipe
- Two sensors incl. connecting cables.

Mounting rail and POSITION SENSOR installation distance

The mounting rail has two rows with bores. The bores in one of the rows are indicated by letters and the bores in the other row are indicated by numerical values. The value determined for the POSITION SENSOR installation distance is made up of a letter and a numerical value. The bores that are identified by the specific letter and numerical value are used to position the strapping bands.

Procedure

1. Position the strapping bands with the aid of the mounting rail.
 - Slide the mounting rail with the bore identified by the letter from POSITION SENSOR over the mounting bolt of the strapping band that is permanently fixed in place.
 - Position the movable strapping band and slide the mounting rail with the bore identified by the numerical value from POSITION SENSOR over the mounting bolt.

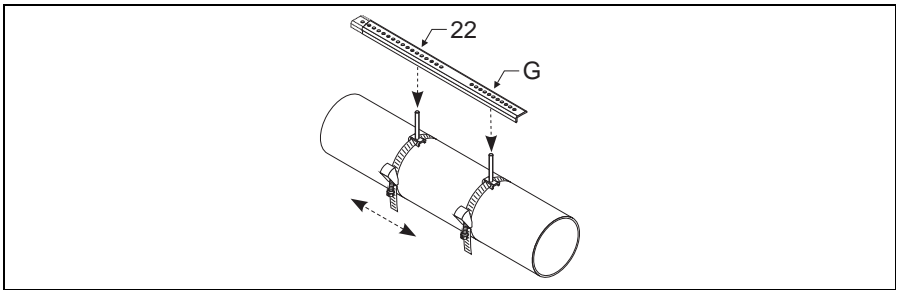


Fig. 21: Determining the distance in accordance with the mounting rail (e.g. POSITION SENSOR G22)

A0001116

2. Tighten the strapping band so that it cannot slip.
3. Remove the mounting rail from the mounting bolt.
4. Fit the sensor holders over the individual mounting bolts and tighten securely with the retaining nut.

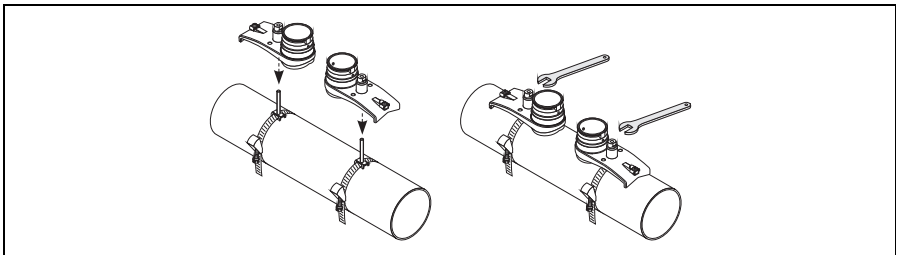


Fig. 22: Mounting the sensor

A0001117

5. Coat the contact surfaces of the sensors with an even layer of coupling fluid approx. 1 mm (0.04") thick, going from the groove through the center to the opposite edge.

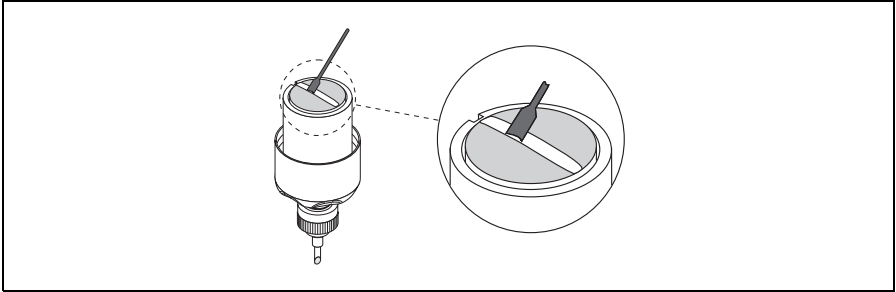


Fig. 23: Coating the contact surfaces of the sensor with coupling fluid

A0011375

6. Insert the sensor into the sensor holder.
7. Fit the sensor cover on the sensor holder and turn until:
 - The sensor cover engages with a click
 - The arrows (▲ / ▼ "close") are pointing towards one another.
8. Screw the connecting cable into the individual sensor.

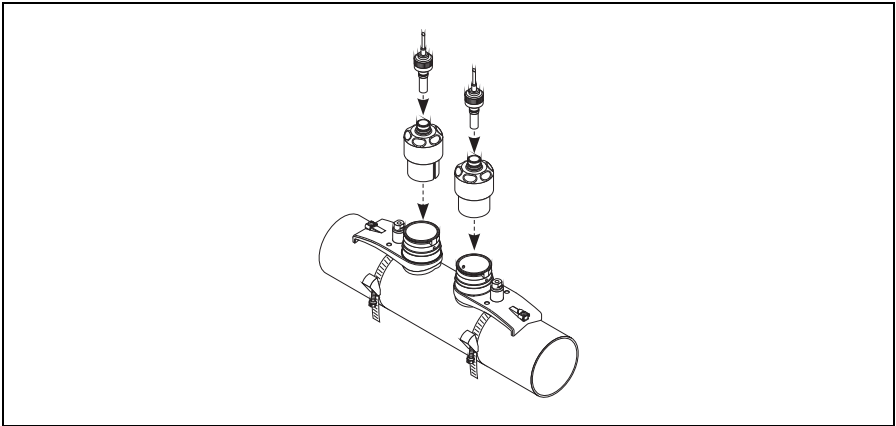


Fig. 24: Connecting the connecting cable

A0011376

This completes the mounting process. The sensors can now be connected to the transmitter via the connecting cables → [30](#).

3.12 Post-installation check

- Are cables or the device damaged (visual inspection)?
- Does the device correspond to specifications at the measuring point, including process temperature and pressure, ambient temperature, minimum fluid conductivity, measuring range, etc.?
- Are the measuring point number and labeling correct (visual inspection)?
- Have the inlet and outlet runs been observed?
- Is the measuring device protected against moisture and direct sunlight?

4 Hardware and software settings

Diverse hardware and software settings are possible or necessary (e.g. device address configuration) for measuring devices with PROFIBUS DP or FOUNDATION Fieldbus type of communication. For a description of the possible settings and the exact procedure that applies for the different types of communication, see the associated Operating Instructions on the CD.

5 Wiring


Warning!

Risk of electric shock. Components carry dangerous voltages.

- Never mount or wire the measuring device while it is connected to the power supply.
- Before connecting the power supply, check the safety equipment.
- Route the power supply and signal cables so they are securely seated.
- Seal the cable entries and covers tight.

Caution!

Risk of damaging the electronic components!

- Connect the power supply (takes place at a later stage →  33)
- Connect the signal cable in accordance with the connection data in the Operating Instructions or the Ex documentation on the CD-ROM.

In addition, for measuring devices with fieldbus communication:

Caution!

Risk of damaging the electronic components!

- Observe the cable specification of the fieldbus cable → Operating Instructions on the CD-ROM.
- Keep the stripped and twisted lengths of cable shield as short as possible.
- Screen and ground the signal lines → Operating Instructions on the CD-ROM.
- When using in systems without potential equalization → Operating Instructions on the CD-ROM.

In addition, for Ex-certified measuring devices:

Warning!

When wiring Ex-certified measuring devices, all the safety instructions, wiring diagrams, technical information, etc. of the related Ex documentation must be observed → Ex documentation on the CD-ROM.

5.1 Sensor/transmitter connecting cable

Warning!

- Risk of electric shock. Switch off the power supply before opening the device. Do not install or wire the device while it is connected to the power supply. Failure to comply with this precaution can result in irreparable damage to the electronics.
- Risk of electric shock. Connect the protective ground to the terminal on the housing before the power supply is applied.

Note!

To ensure correct measuring results, route the cable well clear of electrical machines and switching elements.

5.1.1 Procedure

1. Remove the cover (a) of the connection compartment.
2. Remove the dummy cover from the cable entry (b).
3. Route the two connecting cables (c) of channel 1 through the cable gland (d).
4. Route the two connecting cables of channel 1 through the cable entry (b) and into the connection compartment of the transmitter.
5. Place the cable retaining sleeves (e) of the two connecting cables at the ground contact terminals (f) (Detail B).
6. Twist down the ground contact terminals (f) so that the two cable retaining sleeves (e) are firmly seated.
7. Screw the ground contact terminals (f) tight.

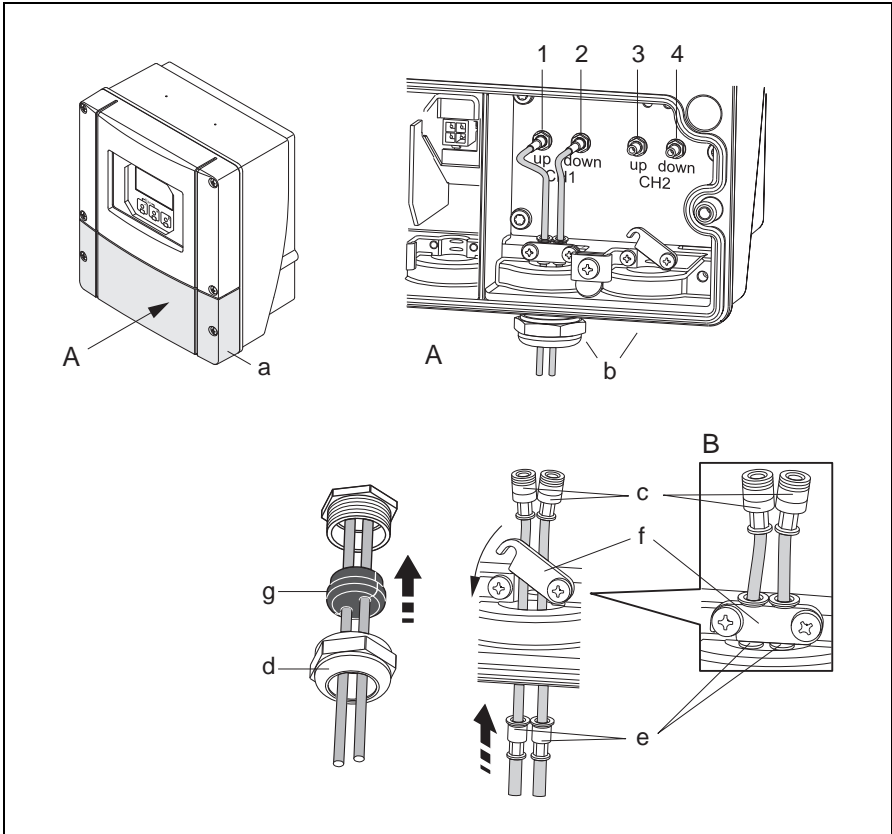
**Note!**

The Prosonic Flow P (DN 15 to 65 / ½ to 2½") is grounded via the cable gland
→ 33.

8. Connect the connecting cable:
 - Channel 1 upstream = 1
 - Channel 1 downstream = 2
 - Channel 2 upstream = 3
 - Channel 3 downstream = 4
9. Spread the rubber seal (g) along the side slit with a suitable tool (e.g. a large screwdriver) and fix both connecting cables into place.
10. Push the rubber seal (g) up into the cable entry (b).
11. Tighten the cable gland (d).
12. Fit the cover (a) on the connection compartment and screw it on.

**Note!**

The connection compartment does not have to be assembled if the transmitter is wired (power supply and signal cable) directly afterwards.



A0008054

Fig. 25: Connecting the sensor/transmitter connecting cable

- A View A
 B Detail B
- 1 Sensor cable connector, channel 1 upstream
 2 Sensor cable connector, channel 1 downstream
 3 Sensor cable connector, channel 2 upstream
 4 Sensor cable connector, channel 2 downstream
- a Connection compartment cover
 b Cable entries (with cable gland for two connecting cables per cable entry)
 c Connecting cables
 d Cable gland
 e Cable retaining sleeves
 f Ground contact terminals (only Prosonic Flow P DN 50 to 4000 (2 to 160"),
 for grounding of the Prosonic Flow P DN 15 to 65 (1/2 to 2 1/2"), see next section)
 g Rubber seal

5.1.2 Grounding Prosonic Flow P DN 15 to 65 (½ to 2½")

The Prosonic Flow P DN 15 to 65 (½ to 2½") is grounded via the cable gland.

Procedure

1. Guide the connecting cables through the cable gland.
2. Position the connecting cables in such a way that the heat shrink tube ends at the edge of the cable gland (the stripped part of the connecting cable is thus in the correct position).
3. Tighten the nut of the cable gland (this twists the pins in the cable gland against the shielding of the connecting cable and establishes grounding).

5.1.3 Cable specification for connecting cable

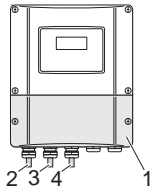
Only use the connecting cables supplied by Endress+Hauser.

Operation in areas with strong electrical interference

The measuring system complies with the general safety requirements in accordance with EN 61010, the EMC requirements of IEC/EN 61326 "Emission as per Class A requirements" and NAMUR Recommendation NE 21.

5.2 Connecting the transmitter

Wire the unit using the terminal assignment diagram inside the cover.



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Transmitter connection:

- 1 Connection compartment cover (connection diagram on the inside)
- 2 Power supply cable (already connected when mounting)
- 3 Signal cable
- 4 Fieldbus cable

5.3 Protective ground connection

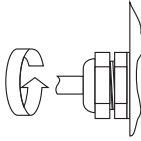
The sensor must be connected to the protective ground of the plant. The plant grounding guidelines must be taken into account.

5.4 Degree of protection

The devices meet all the requirements for IP 67.

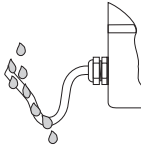
After mounting in the field or service work, the following points have to be observed to ensure that IP 67 protection is retained:

- Install the measuring device in such a way that the cable entries do not point upwards.
- Do not remove the seal from the cable entry.
- Remove all unused cable entries and plug them with suitable, certified drain plugs.
- When working at low temperatures (below $-20\text{ }^{\circ}\text{C}$ ($-4\text{ }^{\circ}\text{F}$)), in particular, ensure the suitability of the cables, cable entries and plugs is certified for these temperatures.



A0007549

Tighten the cable entries correctly.



A0007550

The cables must loop down before they enter the cable entries ("water trap").

5.5 Post-connection check

- Are cables or the device damaged (visual inspection)?
- Does the supply voltage match the information on the nameplate?
- Do the cables comply with the specifications?
- Do the mounted cables have adequate strain relief and are they routed securely?
- Is the cable type route completely isolated? Without loops and crossovers?
- Are all screw terminals firmly tightened?
- Are all cable entries installed, firmly tightened and correctly sealed?
- Cable routed as a "water trap" in loops?
- Are all the housing covers installed and securely tightened?

In addition, for measuring devices with fieldbus communication:

- Are all the connecting components (T-boxes, junction boxes, connectors, etc.) connected with each other correctly?
- Has each fieldbus segment been terminated at both ends with a bus terminator?
- Has the max. length of the fieldbus cable been observed in accordance with the specifications?
- Has the max. length of the spurs been observed in accordance with the specifications?
- Is the fieldbus cable fully shielded and correctly grounded?

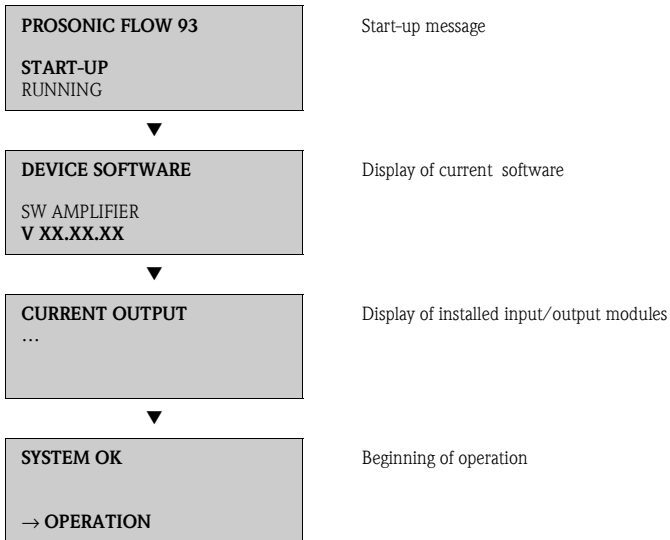
6 Commissioning

6.1 Switching on the measuring device

On completion of the installation (successful post-installation check), wiring (successful post-connection check) and after making the necessary hardware settings, where applicable, the permitted power supply (see nameplate) can be switched on for the measuring device.

When the power supply is switched on, the measuring device performs a number of power-up checks and device self-checks. As this procedure progresses the following messages can appear on the onsite display:

Display examples:



The measuring device starts operating as soon as the startup procedure is complete. Various measured values and/or status variables appear on the display.



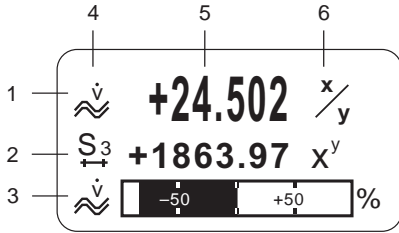
Note!

If an error occurs during startup, this is indicated by an error message.

The error messages that occur most frequently when a measuring device is commissioned are described in the Troubleshooting section → 38.

6.2 Operation

6.2.1 Display elements

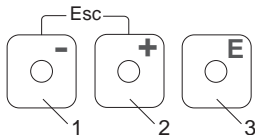


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Display lines/fields

1. Main line for primary measured values
2. Additional line for additional measured variables/status variables
3. Information line for bar graph display for example
4. Info icons, e.g. volume flow
5. Current measured values
6. Engineering units/time units

6.2.2 Operating elements



A0007559

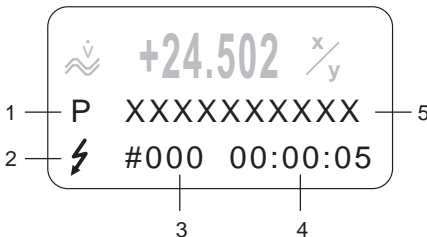
Operating keys

1. (-) Minus key for entering, selecting
2. (+) Plus key for entering, selecting
3. Enter key for calling the function matrix, saving

When the +/- keys are pressed simultaneously (Esc):

- Exit the function matrix step-by-step:
- > 3 sec. = cancel data input and return to the measured value display

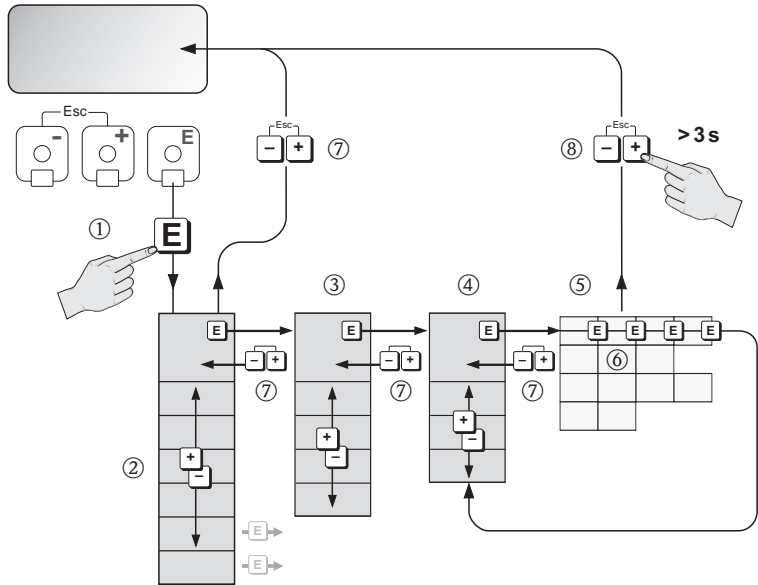
6.2.3 Displaying error messages



A0007664

1. Type of error:
P = Process error, S = System error
2. Error message type:
f = Fault message, ! = Notice message
3. Error number
4. Duration of the last error that occurred:
Hours: Minutes: Seconds
5. Error designation
List of all error messages, see associated Operating Instructions on the CD-ROM

6.3 Navigating within the function matrix















A0007665

1. → Enter the function matrix (starting with measured value display)
2. → Select the Block (e.g. USER INTERFACE)
 → Confirm selection
3. → Select the group (e.g. CONTROL)
 → Confirm selection
4. → Select the function group (e.g. BASIC CONFIGURATION)
 → Confirm selection
5. → Select function (e.g. LANGUAGE)
6. → Enter code **93** (only for the first time you access the function matrix)
 → Confirm entry

 → Change function/selection (e.g. ENGLISH)
 → Confirm selection
7. → Return to measured value display step by step
8. > 3 s → Return immediately to measured value display

6.4 Calling the Commissioning Quick Setup

All the functions needed for commissioning are called up automatically with the Quick Setup. The functions can be changed and adapted to suit the individual processes.

1.  → Enter the function matrix (starting with measured value display)
2.  → Select the group QUICK SETUP
 → Confirm selection
3. QUICK SETUP COMMISSIONING function appears.
4. Intermediate step if configuration is blocked:
 → Enter the code **93** (confirm with ) and thus enable configuration
5.  → Go to Commissioning Quick Setup
6.  → Select YES
 → Confirm selection
7.  → Start Commissioning Quick Setup
8. Configure the individual functions/settings:
 - Via -key, select option or enter number
 - Via -key, confirm entry and go to next function
 - Via -key, return to Setup Commissioning function (settings already made are retained)

.Note!

Observe the following when performing the Quick Setup:

- Configuration selection: Select the ACTUAL SETTING option
- Unit selection: This is not offered again for selection after configuring a unit
- Output selection: This is not offered again for selection after configuring an output
- Automatic configuration of the display: select YES
 - Main line = volume flow
 - Additional line = totalizer 1
 - Information line = operating/system condition
- If asked whether additional Quick Setups should be executed: select NO

All the available functions of the measuring device and their configuration options as well as additional Quick Setups, if available, are described in detail in the "Description of Device Functions" Operating Instructions. The related Operating Instructions can be found on the CD-ROM.

The measuring device is ready for operation on completion of the Quick Setup.

6.5 Troubleshooting

A complete description of all the error messages is provided in the Operating Instructions on the CD-ROM.

.Note!

The output signals (e.g. pulse, frequency) of the measuring device must correspond to the higher-order controller.

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